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EXAMINER	
LANE, JEFFREY D	

ART UNIT	PAPER NUMBER
2828	

DATE MAILED: 11/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/701,258	LANG ET AL.
	Examiner	Art Unit
	Jeffrey D. Lane	2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 November 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/30/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the heating element must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "126", has been used to designate both laser diode beam and output, for examination purposes 126 is interpreted as an output beam in figs 3a and 3b, and is interpreted as a laser diode beam in figs 2,3,7, and 8. Reference character "140" has been used to designate both high-power beam and output laser beam; in figure 2 shows it as a output beam, however in figure 9, it is unclear to the examiner how "140" can be an output beam, but it is clear how it can be a high-power beam. Reference character "400" has been used to designate both electrical heating or heating and cooling element and transparent material; in figure 4a it is interpreted that 400 refers to a transparent material, while in figure 10 it is interpreted as meaning heating element. Reference character "410" has been used to designate both anti-reflection coating, optical detector, and periodically corrugated surface, it is unclear to the examiner which 410 is the corrugated surface and which 410 is the antireflection coating in fig. 4a; the examiner interprets the 410 in figure 10 as the optical detector. Reference character "123" has been used to designate both light and polarization controller; the examiner interprets 123 in fig. 2a as a polarization controller and 123 in figs. 3a and 3b as light. Reference character "145" has been used to designate both laser beam and optical isolation means; it is unclear to the examiner how reference 145 labeled on any figure can be construed as a laser beam. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should

include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: The drawings have the following reference characters that are not found with in the specification "99", "117", "137", "160", "175", and "573". Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. Figures 1a and 1b should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected

drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4.

Specification

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Laser Device with Collimating Means and Transmission Grating.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 23, 25 and 26 recite the limitation "the frequency-doubled beam" in last line of claim 23. There is insufficient antecedent basis for this limitation in the claim. There is no structure following the dependencies of claim 23, namely claims 1, 3, and 22, to have the structure to double the frequency. There is also no reference in the claims it depends on that make a previous mention of a "frequency-doubled beam".

As for claim 25 there is no previous reference to a "said control means", to or "the nonlinear element". Claim 25 also depends on claim 23.

As for claim 26 there is no previous reference to "said control means" or to "the heating element". Claim 26 also depends on claim 23.

8. Claim 26 rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: what the heating element in this claim is heating.

For examination purposes "the heating element" is replaced with "the optical detector".

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1, 3-6, 8, 12 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Suganuma et al. (US 2002/0012377).

As for claim 1 Suganuma discloses, in figure 20, A laser apparatus, comprising a laser diode 1 having a reflective back facet and a front facet having a reflectance of less

than 1% (see Paragraph [0101]) for emitting an optical beam at a fundamental frequency along an optical path, collimating means 2 for at least partially collimating the optical beam into an at least partially collimated beam along the optical path, a transmission grating 3 (see Paragraph [0103]) optically coupled to receive the at least partially collimated beam and for returning a portion of the at least partially collimated beam back into the laser diode (see paragraph [0157]) by means of diffraction through the collimating means 2 and the laser diode 1 front facet, wherein the laser diode reflective back facet and the transmission grating form an extended laser cavity, and wherein in operation, at least a substantial portion of the at least partially collimated beam is transmitted through the transmission grating for producing the laser output beam propagating along the optical path (See paragraph [0157]). Suganuma further discloses in Paragraph [0101], "It is desired that the semiconductor laser oscillator 1 have an anti-reflection (AR) coating on its output end so that the output end may have reflectance of 0.001% or less." Suganuma continues to further disclose in Paragraph [0103], "The volume hologram 3 is a three-dimensional diffraction grating".

As for claim 3, Suganuma discloses, wherein the extended cavity is an extended cavity in a Littrow configuration formed by the transmission grating (See paragraph [0159]).

As for claim 4-6, Suganuma discloses, a frequency-doubling nonlinear element 23 positioned outside of the extended cavity to receive the laser output beam for producing a frequency-doubled optical output beam. Suganuma further discloses, "The nonlinear optical crystal 23 converts the laser beam to second harmonic waves. That is, the laser

beam having a wavelength of 920 nm is changed to second harmonic waves having a wavelength of 460 nm " (Paragraph [0158]).

As for claim 8, Suganuma discloses, using a laser with a fundamental frequency of 920nm, which is in the range of several frequency doubling crystals that Suganuma discloses. (see Table 1).

As for claim 12, Suganuma discloses, in paragraph [0155], "The modification of FIG. 20, or the fourth modification, is different from the eighth modification (FIG. 14) in that the concave mirror 6, flat mirror 10 and nonlinear optical crystal 5 constitute a ring-shaped external resonator. " The ring shaped resonator would pass the laser beam through the nonlinear element multiple times.

As for claim 14, see rejection for claim 1.

11. Claims 1 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Sidorin et al. (US 2003/0214700). Sidorin discloses in figure 1A, A laser apparatus, comprising a laser diode 100 having a reflective back facet 105 and a front facet having a reflectance of less than 1% 110 for emitting an optical beam 145 at a fundamental frequency along an optical path, collimating means 120 for at least partially collimating the optical beam 145 into an at least partially collimated beam 145 along the optical path, a transmission grating 115 optically coupled to receive the at least partially collimated beam 120 and for returning a portion of the at least partially collimated beam back into the laser diode 100 by means of diffraction through the collimating means 120 and the laser diode 100 front facet 110, wherein the laser diode 100 reflective back facet 105 and the transmission grating 115 form an extended laser cavity, and wherein

in operation, at least a substantial portion of the at least partially collimated beam 145 is transmitted through the transmission grating 115 for producing the laser output beam 146 propagating along the optical path. Sidorin further discloses, "The laser 100 has an end facet with high reflectivity 105, provided in known manner, and an end facet with low reflectivity 110, also provided in known manner, for emitting electromagnetic radiation into the external cavity. " (Paragraph [0075]), "The diffraction device might comprise a reflection or a transmission grating. " (Paragraph [0020]). Sidorin further discloses, "The configuration shown in FIG. 1A is a Littrow configuration ... " (See paragraph [0078]). Sidorin continues, "The diffractive structure might be provided by a phase or an amplitude grating, for instance as a surface relief grating... " (Paragraph [0042])

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma et al. (US 2002/0012377) in view of Cook (US 6,432,471). Suganuma discloses all that pertains to claim 1. However Suganuma does not disclose using a rotatable grating. Cook discloses, "The lasing wavelength is changed (i.e., tuned) by rotating the grating 30 about an axis 32 perpendicular to the beam axis 34." (Column 4 lines 30-32) Therefore it would have been obvious to one of ordinary skill in the art at the time of the

invention to use a rotatable grating in Suganuma's laser device to tune the lasing wavelength.

14. Claims 1, 7, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bahatt et al. (US 6,600563) in view of Sidorin et al. (US 2003/0214700).

As for claim 1, Bahatt discloses, in figure 1, a laser apparatus, comprising a laser diode 10 for emitting an optical beam at a fundamental frequency along an optical path, collimating means 40 for at least partially collimating the optical beam into an at least partially collimated beam along the optical path, a transmission grating 50 optically coupled to receive the at least partially collimated beam and for returning a portion of the at least partially collimated beam back into the laser diode by means of diffraction through the collimating means 40 and the laser diode 10 front facet, wherein the laser diode reflective back facet and the transmission grating form an extended laser cavity, and wherein in operation, at least a substantial portion of the at least partially collimated beam is transmitted through the transmission grating 40 for producing the laser output beam propagating along the optical path. However Bahatt does not disclose using a reflective back and an anti-reflective front. Sidorin discloses "In the ECL, the "lasing" cavity is sometimes described as a "gain" cavity rather than a lasing cavity as the end facet is anti-reflection coated, giving the laser diode the construction of a gain element rather than a laser. " (paragraph [0004]). Sidorin further discloses "The facet may uniquely ... define the physical length of the external cavity by providing a discrete change in direction in the optical path. " (paragraph [0004]). Therefore it would have been obvious to one of ordinary skill

in the art at the time of the invention to make Bahatt's front end facet of the laser diode anti-reflective to give the laser a gain element construction and to make the back end facet of the laser diode reflective to define the physical length of the external cavity.

As for claim 7, Bahatt discloses, "The transmission of this grating for `p` polarized light is around 90%. " (Column 13 lines 42-43). Bahatt further notes, "As shown in FIG. 1 a dichroic linear film polarizer 20 ... is used for polarizing the light in the `p` (II) direction. " (column 12 lines 10-14).

As for claim 18 see claim 7.

As for claim 19, it is well known in the art to rotate laser diodes to get desired polarization, as evidenced by Naganuma (US 6,452,720). Therefore it would be obvious to one of ordinary skill in the art to rotate the laser to the desired polarization instead of using a polarizer as disclosed for claim 18 to use less parts.

As for claim 20, in figure 8 Bahatt discloses, a laser diode 400 emitting an optical beam, a collimating means 390, a transmission grating 380 receiving collimated beam. Bahatt further discloses, "The anamorphic lens system 120 can be a single lens, a combination of a standard lens and a cylindrical lens, or a spherical mirror ... "(Column 16 lines 7-9). However Bahatt does not disclose using a reflective back and an anti-reflective front. Sidorin discloses "In the ECL, the "lasing" cavity is sometimes described as a "gain" cavity rather than a lasing cavity as the end facet is anti-reflection coated, giving the laser diode the construction of a gain element rather than a laser. " (paragraph [0004]). Sidorin further discloses "The facet may uniquely ... define the physical length of the external cavity by providing a discrete change in direction in the optical path. " (paragraph [0004]). Therefore it

would have been obvious to one of ordinary skill in the art at the time of the invention to make Bahatt's front end facet of the laser diode anti-reflective to give the laser a gain element construction and to make the back end facet of the laser diode reflective to define the physical length of the external cavity.

15. Claims 9 and 10 rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma et al. (US 2002/0012377) in view of Burns et al. (US H1965H). Suganuma discloses all that pertains to claim 4. Suganuma does not disclose however using a periodically poled crystal. Burns discloses, "It will be appreciated that this represents significant improvements in tuning range and power over previous DFG system results and demonstrates a near-theoretical nonlinear conversion efficiency in field-poled $LiNbO_3$" (see column 8 lines 50-54). There fore it would have been obvious to one of ordinary skill at the time of the invention to use a $LiNbO_3$ periodically poled crystal in Suganuma's laser device to achieve a near-theoretical nonlinear conversion efficiency.

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma et al. et al. (US 2002/0012377) in view of Hayakawa (US 6,885,687). Suganuma discloses all that pertains to claim 4. However Suganuma does not disclose using a non-linear waveguide. Hayakawa discloses in figure 10, using a non-linear waveguide 15. Hayakawa further discloses, "When the laser beam 11 is incident on the optical channel waveguide 18 so that the direction of linear polarization of the laser beam 11 is parallel to the surface 16a of the substrate 16, a .lambda./2 plate or the like, which rotates the direction of linear polarization, is unnecessary. " (Column 9 lines 52-56). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a

non-linear waveguide with Suganuma's laser device to make the use of a λ/2 plate unnecessary.

17. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma et al. (US 2002/0012377) in view of Yang et al. (US 6,704,509). Suganuma discloses all that pertains to claim 1 (see above). However Suganuma does not discloses using an anti-reflection coating on the grating. Yang discloses, "The transmissive grating assembly 50 includes at least one substrate and a diffractive element. In the depicted embodiment, the grating assembly 50 includes first and second substrates 50a and 50b, and a diffractive element 50c disposed between the first and second substrates. Each of the first and second substrates 50a and 50b may be formed from low scattering glass having surfaces coated with an anti-reflection coating to enhance the passage of radiation. "(Column 6 lines 1-8). There fore it would have been obvious to one of ordinary skill in the art at the time of the invention to use an anti-reflection coating on Suganuma's diffraction grating to enhance the passage of radiation.

18. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma et al. (US 2002/0012377) in view of Swanson et al. (US 5,956,355).

As for claim 16, Suganuma discloses all that pertains to claim 4 (see above). However Suganuma does not disclose using an optical isolator after the grating. Swanson discloses, "The isolator 84 ... serves to minimize reflections which can detrimentally effect the laser stability. "(Column 5 lines 33-35). There fore it would have been obvious to one of ordinary skill in the art to use an isolator in Suganuma's invention after the grating to stabilize the laser.

As for claim 17, the isolator as described for claim 16 above, is a coupling means associated with the nonlinear element for optical coupling of the laser output beam, which is configured for preventing back reflections into the extended laser cavity.

19. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma et al. (US 2002/0012377) in view of Allenson et al. (US 6,829,278).

As for claim 21, Suganuma discloses all that pertains to claim 3 (see above). However Suganuma does not disclose using a single-frequency laser. Allenson discloses, "Although single mode lasers are necessary for high frequency operation, due to mode noise... "(Column 5 lines 4-6). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a single-frequency laser in Suganuma's laser device to be able to use it in a high-frequency operation.

As for claim 22, Suganuma discloses all that pertains to claim 3 (see above). However Suganuma does not disclose using a multi-frequency laser. Allenson discloses, "Although single mode lasers are necessary for high frequency operation, due to mode noise, for lower frequencies multi mode lasers or light emitting diodes may be used in the device. "(Column 5 lines 4-7). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a multi-frequency laser in Suganuma's laser device to be able to use it in a low-frequency operation.

20. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma et al. in view of Allenson et al. as applied to claim 22 above, and further in view of Ziari et al. (US 6,215,809). Suganuma and Allenson disclose all that pertains to claim 22 as described above. However Suganuma and Allenson do not disclose using

a dither current. Allenson discloses "The first derivatives of <of the power to current> curves 162 and 163, denoted as 166 and 167, respectively, are much smoother and clearly show that the kinks are reduced with increased dither amplitude." (Column 12 lines 58-61) Allenson further discloses "According to the teachings of another aspect of the present invention, a method for operating a laser source to improve operating stability comprises applying an electrical signal to an electrical input of the laser source to generate a light beam output " (Column 4 lines 45-49) Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a dither current to get a smoother power to current ratio.

21. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma et al. (US 2002/0012377) in view of Ziari et al. (US 6,215,809). Suganuma discloses all that pertains to claim 5 (see above). However Suganuma does not disclose using a means for controlling optical power. . Allenson discloses "The first derivatives of <of the power to current> curves 162 and 163, denoted as 166 and 167, respectively, are much smoother and clearly show that the kinks are reduced with increased dither amplitude." (Column 12 lines 58-61) Allenson further discloses "According to the teachings of another aspect of the present invention, a method for operating a laser source to improve operating stability comprises applying an electrical signal to an electrical input of the laser source to generate a light beam output " (Column 4 lines 45-49) Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a

dither current to get a smoother power to current ratio. The dither current is a means for controlling optical output.

22. Claim 25 rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma, Allenson, and Ziari as applied to claim 23 above, and further in view of Govorkov et al. (US 6,614,584). Suganuma, Allenson and Ziari disclose all that pertains to claim 23 (see above). However they do not disclose using a feedback circuit with an optical detector and a heating element to change the temperature of the nonlinear element. Govorkov discloses in figure 6, an optical detector 250 for measuring optical power of the frequency-doubled output beam; a heating element for changing temperature of the nonlinear element 102 and 202; and, an electrical feedback circuit 153 electrically coupling the heating element with the optical detector 250. Govorkov further discloses, "The fourth embodiment <figure 6> utilizes a different concept of automatic adjustment in a single or multi-stage converter. It is particularly advantageous when the beam profile of beam 106 has a complex shape... " Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use an optical detector connected to heating elements for the nonlinear element in Suganuma's laser device so that a complex beam shape can be formed and controlled.

23. Claim 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Suganuma, Allenson, and Ziari as applied to claim 23 above, and further in view of Daiber (US 6,816,516). Suganuma, Allenson and Ziari disclose all that pertains to claim 23 (see above). However they do not disclose using a feedback circuit with an optical detector and a means for rotating the transmission grating. Diaber discloses in figure

9a, optical control means comprising an optical detector 56 for measuring optical power of the frequency-doubled output beam 22; means for rotating the transmission grating 36 for tuning of the fundamental laser frequency; and, an electrical feedback circuit electrically connecting the optical detector 56 with the means for rotating the transmission grating 36. Diaber further discloses, "If the constructive interference fringe defined by grating 118 is not centered, spatial loss to the retroreflected portion of the beam occurs... " (Column 16 lines 1-3). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use to control the angle of the grating through a feedback mean in Suganuma's laser device to avoid spatial loss.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey D. Lane whose telephone number is (571) 272-1676. The examiner can normally be reached on Monday thru Friday 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jeffrey D Lane
Examiner
Art Unit 2828

JDL

MINSUN OH HARVEY
PRIMARY EXAMINER